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A Basic Tool List for a New Vocational Agricultural Shop in South Dakota

Kenneth Bohuslav

A BASIC TOOL LIST FOR A NEW VOCATIONAL AGRICULTURAL SHOP IN SOUTH DAKOTA

By

Kenneth Lloyd Bohuslav

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SECTION I

INTRODUCTION

Some confusion and misunderstanding is evident as to the essential tools required for vocational agricultural and industrial arts shops. An attempt will be made in this study to suggest a basic tool list for an average vocational agricultural shop in South Dakota.

Some lay people who visit the vocational agricultural shop are surprised that certain equipment generally found in industrial arts shops, like wood shapers, wood turning lathes or thickness planers, has been omitted. Frequently they do not realize that the objectives of a vocational agricultural shop are very different from those of an industrial arts shop. As a result many vocational agricultural shops have been equipped not to serve as they were intended, but as industrial arts shops. Having hundreds of dollars' worth of idle equipment may create a problem for the vocational agricultural teacher and furthermore is poor economy. Letting students use this equipment just to keep them busy is not justifiable since some vocational agricultural teachers are not trained in the correct use of this equipment.

Another problem is the over-purchasing of some tools and the lack of purchasing of other very important tools. From the writer's experience in a shop that had been equipped just prior to his employment he found that there were fifteen new ball pein hammers where four or five would have been sufficient. In contrast to this there were no pipe wrenches. This shop had great quantities of tools, but many were of little use in a farm mechanics shop. The funds that had been spent on this unwanted equipment should have been spent on more necessary equipment.

The members of the board of education and supervisory personnel are very proud of a new shop. They assume that it has been equipped properly. When it becomes necessary for the instructor to ask for more equipment in order to conduct his shop class properly, often some doubt is in evidence.

If the shop is equipped correctly in the beginning, a great deal of money can be saved or put to work where it is needed. There will be less work for the instructor and better relations between the vocational agricultural teacher and his supervisors.

SECTION II

PURPOSE

The primary purpose of this study is to formulate a guide for equipping a farm mechanics shop in South Dakota with the basic tools. The study concerns the following factors:

1. What tools are essential in a new farm mechanics shop?
2. How many of each of these are needed in a beginning farm mechanics shop?
3. What tools are used a great deal?
4. What tools are necessary, but not used frequently?
5. Which tools are sometimes necessary, but are not essential in a beginning shop?
6. What tools are never used in a vocational agricultural shop in the actual farm mechanics shop work?
7. What is the recent estimated average cost of equipping a vocational agricultural shop with the necessary tools?
8. Is a separate tool room necessary enough to warrant the extra expense?

SECTION III

PROCEDURE

First, a list of all the possible tools that could be used in a shop was compiled. This list included, as near as possible, all the tools used in a farm mechanics shop, and some of those that, in the author's opinion, would have little or no use. There were tools omitted that possibly could be used, but a space was provided at the end of this list for the respondents to indicate the names of other tools.

Next, a letter of explanation, Appendix A, and an evaluation sheet, Appendix B, were designed to be sent out to teachers of vocational agriculture in South Dakota. Next to each tool named there were five blanks. The first blank asked for information as to the number of tools teachers considered essential in a vocational agricultural shop. The other four blanks were evaluations regarding the necessity of this tool. These four blanks asked for the following information: (1) "Used a great deal," (2) "Necessary, but not used frequently," (3) "Necessary, but not essential in a beginning shop," (4) "Never used." If a tool was frequently used and essential to the operation of the shop, then the teacher was to check "Used a great deal." If the tool was essential to the proper operation of the shop but not frequently used, the teacher was to check "Necessary, but not

used frequently." When a tool could be used in the farm mechanics shop, but was not absolutely essential to its operation, the teacher was to check "Necessary, but not essential in a beginning shop." Where a tool was never used in a farm mechanics shop, the teacher checked "Never used."

On the last page of the evaluation sheet following the list of tools there were five related questions. They were used to determine the following factors:

1. The estimated cost of a well equipped vocational agricultural shop.
2. Suggested floor space for a farm mechanics shop.
3. Would a separate tool room warrant the extra expense?
4. Should an extra toilet and washroom be included?
5. Suggestions these teachers might have which would help to make this study more useful.

This evaluation sheet was sent to 72 teachers of vocational agriculture in South Dakota. When the sheets were returned, only those answered by teachers with at least one year's experience were used in the tabulations. Of the 72 questionnaires mailed out 44 of these (61.1 per cent) were returned within a period of four weeks. A post card was then sent out as a reminder to those who had not returned the evaluation sheet. Sixteen more were returned making a total of 60 (83.1 per cent).

The results were tabulated. The totals of each of the five columns may not total 60 as some of the teachers did not answer all of the items.

To find the number of tools thought to be required in a farm mechanics shop, the columns were added up and the "mean" or "average" was found. If the average ranged from 1 to 1.3, then only one tool was suggested in the recommendations. When the average ranged from 1.4 to 1.7, one to two tools were suggested in the recommendations.

As to the necessity of the tools in a vocational agricultural shop, this was determined in percentages as shown in Table II.

SECTION IV

REVIEW OF LITERATURE

In reviewing the literature for this study, several lists were found which gave a basic number of tools for a vocational agricultural shop. Some of the literature went into great detail on the type of shop, size, and arrangement, but told little about the actual equipment necessary in the shop.

In speaking of the importance of shop equipment, Phipps and Cook[1] stated the following:

> Shop instruction cannot be conducted successfully without sufficient equipment. Equipment should not be purchased unless it fulfills a need, but an instructor must have adequate tools and equipment before he can provide effective instruction in farm mechanics.

The above statement makes it clear that a shop should be well enough stocked with tools for the instructor to do his job effectively, but that tools should not be purchased if they are not needed. All the tools that are necessary are those tools which the instructor can use in providing effective instruction in farm mechanics. A tool should not be purchased just because it would be desirable to have. If it has no use in the instruction, it has no purpose in the shop.

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[1] L.J. Phipps and G.C. Cook, Handbook on Teaching Vocational Agriculture, Danville, Illinois, The Interstate, 1952. p. 827.

Phipps and Cook[1] give strong support to the fact that a shop should have good tools and equipment. They state:

> It is poor economy to purchase unknown brands of tools and equipment. It is also poor economy to purchase tools and equipment of inadequate size and substandard quality. It is more desirable to have a few standard quality tools of adequate size and kind than to have a large number of "cheap" tools. Always buy good quality tools and equipment of a desirable size. Buy tools which carry a guarantee against breakage and poor workmanship. In requisitioning tools, complete specifications such as numbers, size and brands must be given. The cheapest bid may not be the best buy.

Another factor which must be given consideration is the needs of the community. The agricultural shop must fit the needs of the community if it is to be effective in the community it serves. The instructor should make a survey of his community before any equipment for his shop is purchased. Mr. Harold Urton[2], state supervisor of agricultural education in South Dakota, had this to say in a letter to the writer:

> As I travel around the state and observe the work being done in different shops, I see a vast difference in the type of work being done in different areas. As a result of all this, you know I have never made a definite demand regarding the equipment for a shop but rather have urged that each school provide those things that they find necessary and have a budget set up that will permit them to purchase these things as they go along.

In order to understand what goes on in a farm shop, one must first examine the definition of the term "farm mechanics."

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[1] L.J. Phipps and G.C. Cook, Handbook on Teaching Vocational Agriculture, Danville, Illinois, The Interstate, 1952. p. 829.

[2] H.E. Urton, personal letter, June 12, 1957.

Cook, Walker, and Snowden[1] explain this as follows:

> The term "farm shop work" and "farm mechanics" are generally used interchangeably in connection with the program in vocational agriculture. However, the more recent term commonly used is "farm mechanics" which includes all the specialized mechanical activities that should be done on the farm and in the home with the kinds of tools and equipment the farmer has accessible. Farm mechanics is a much more inclusive term than farm shop.

Cook, Walker, and Snowden[2] go on to point out the activities included in farm mechanics. They state that the Subcommittee on Agricultural Teacher Training of the American Society of Agricultural Engineers in collaboration with an Advisory Group of Agricultural Education Specialists, recommended in their report the five following areas of instruction in farm mechanics:

1. Farm Shop Work. Selection, sharpening, care and correct use of shop tools and equipment; woodwork and simple carpentry; sheet metal work; elementary forge work; electric arc and oxyacetylene welding; pipe fitting; simple plumbing repairs; rope work.

2. Farm Power and Machinery. Selection, management, adjustment, operation, maintenance and repairing (excluding major repairs requiring specialized equipment and services) of farm gas engines, tractors, trucks and the principle farm machines.

3. Farm Buildings and Conveniences. Elementary scale drawing and plan reading; farmstead layout; functional requirements of farm houses, shelters, and storages; water systems; septic tanks and sewage disposal; heating.

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[1] Obed Snowden, G.C. Cook and Clyde Walker, Practical Methods in Teaching Farm Mechanics, Danville, Illinois, The Interstate, 1952. p. 9.

[2] Ibid., p. 9.

4. Soil and Water Management. Elementary leveling, land measurement and farm mapping; farm drainage; farm irrigation; terracing; contour farming, strip cropping, (emphasis on various phases to be varied in accordance with local or regional needs).

5. Rural Electrification. Utilization of electricity in the home and in the productive farm enterprises; selection, installation, operation, and maintenance of electrical equipment.

Cook, Walker and Snowden[1] in the appendix of their book give a minimum list of tools and equipment by categories for use in a farm mechanics shop. They break this tool list down into the following eleven headings:

1. General Purpose
2. Carpentry and Woodworking
3. Hot and Cold Metal Work
4. Drawing and Planning
5. Concrete and Masonry
6. Electrical Work
7. Painting and Glazing
8. Plumbing and Pipe Fitting
9. Sheet Metal and Soldering
10. Truck, Tractor and Machinery Repair
11. Welding, Arc and Oxy-acetylene

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[1] Obed Snowden, G.C. Cook and Clyde Walker, Practical Methods in Teaching Farm Mechanics, Danville, Illinois, The Interstate, 1952. p. 642.

SECTION V

RESULTS OF THE STUDY

The basic findings of this study as presented in this section will be treated in their areas: "Used a great deal," "Necessary, but not used frequently," "Necessary, but not essential in a beginning shop," and "Never used."

Considering the first three areas "Used a great deal," "Necessary, but not used frequently," and "Necessary, but not essential in a beginning shop," the writer was aware that some arbitrary point must be established to determine the need of the various tools. Based upon the author's five years of experience as a teacher of vocational agriculture, and after a very careful survey of the list (Table I), every tool that had been recommended by more than 81 per cent of the vocational agricultural teachers who returned the evaluation sheet, was recommended.

TABLE I

TOOL EVALUATION

The value (per cent) that the respondents placed on each tool. 1. Used a great deal. 2. Necessary, but not used frequently. 3. Necessary, but not essential in a beginning shop. 4. Never used.

TOOL	VALUE (per cents)			
	1	2	3	4
Anvil, cast iron body, 150# to 200# - - -	81	13	6	0

TOOL	VALUE (per cents)			
Awl, scratch	13	32	35	20
Band saw	39	14	29	18
Bar, wrecking	78	20	2	0
Bench, arc welding	92	2	4	2
Bench, gas welding	70	11	11	8
Bench, work, wall type	87	6	4	3
Bit, expansive 7/8" to 3"	50	44	6	0
Bits, set of, auger wood, 3/16" to 1" by 16ths	98	2	0	0
Blowpipes, oxy-acetylene	65	9	13	13
Blowpipe tips (no. 1-7)	64	8	17	11
Bolt cutter, 24"	27	42	31	0
Braces, auger ratchet	92	6	0	0
Brushes, paint, assorted	85	11	2	2
Brush, wire	84	16	0	0
Caliper, inside	20	47	29	4
Caliper, outside	21	48	27	4
Cans, gasoline	47	27	22	4
Cans, oil	60	32	8	0
Chisels, cape	37	36	19	8
Chisels, cold	77	21	2	0
Chisels, diamond point	27	23	42	8
Chisels, socket type, ¼" to 2"	55	20	16	9
Clamps, adjustable hand screw, 6" to 10"	60	20	18	2
Clamps, "C", metal	69	22	9	0
Clamps, "I", bar, 5'	63	25	10	2

TOOL	VALUE (per cents)			
Compressor, air, portable	35	29	22	14
Compressor, air, stationary	27	11	19	42
Coppers, soldering, assorted 1# to 3#	39	54	5	2
Countersink, rose head	63	33	4	0
Cutter, glass	50	42	8	0
Cutter, pipe	20	39	30	11
Dies, set of, pipe, 1/8" to 2" ratchet	24	40	31	5
Dividers	34	50	16	0
Drill, automatic (8 drill points)	73	7	13	7
Drill, hand, ¼" chuck capacity	79	8	13	0
Drill set, twist,1/16" to ½" by 64ths	90	8	0	2
Drill, star, cement	17	41	22	20
Draw knife 8" or 10"	33	42	20	5
Drill press, ½" chuck	84	8	20	5
Edger, cement	9	32	50	9
Electric extension cord 25' or 50'	86	12	0	2
Electric hand drill, ½"	94	4	2	0
Electric hand drill, ¼"	81	6	13	0
File card and brushes	50	35	9	6
Files, flat,assorted	73	23	4	0
Files, half-round,assorted	65	31	4	0
Files, mill, assorted	67	31	0	2
Files, round, assorted	57	35	8	0
Files, square, assorted	33	31	22	14

TOOLS	VALUE (per cents)			
Files, triangular	56	37	7	0
Fire extinguisher, CO_2	49	34	5	12
Fire extinguisher, foam type	45	33	12	10
Float	13	47	36	4
Forge	16	36	30	18
Funnels	38	52	8	2
Gage, U.S. Standard for iron sheet, wire	5	40	30	25
Gasoline firepot	0	11	22	67
Grinder, high speed	90	8	0	2
Grinder, slow speed	46	19	23	12
Grinding wheel, dresser	58	27	11	4
Gloves, pair	80	18	2	0
Goggles, pair, gas	77	11	6	6
Groover, cement	12	23	51	14
Gun, grease, zerk, lever type	30	34	22	14
Gun, paint, spray	27	47	22	4
Hammers, ball pein	78	20	2	0
Hammers, claw curved, 16 oz.	96	4	0	0
Hammers, claw ripping, 16 oz.	83	15	2	0
Hammers, sledge	43	42	15	0
Hammers, straight pein, 14 lbs.	42	36	15	7
Hatchet, 4" flooring or half	30	36	27	7
Helmets, arc welding	85	9	6	0
Hoist and frame, 8', lift 2000 lbs.	57	26	11	6
Hoses, set of welding	75	7	8	0

TOOLS	VALUE (per cents)			
Jointer, 6" with 3/4 H.P. motor	30	25	30	15
Knife, putty	66	26	6	2
Ladle, pouring lead	8	13	28	51
Lathe, wood turning	25	11	33	31
Lathe, metal turning	9	7	36	48
Level, carpenters, 24"	69	23	6	2
Lighters, gas	54	14	14	18
Mallets, wood	65	29	2	4
Measures, oil	23	37	21	19
Mitre box and saw	62	21	13	4
Nail puller, heavy duty, 18"	56	35	7	2
Nail sets, assorted	72	22	4	2
Hacksaws	68	26	4	2
Oilers, pump type	54	28	8	10
Paint cabinet	63	25	10	2
Plane, block, 6"	77	21	2	0
Plane, jack, 14"	90	8	2	0
Plane, jointer, 20"	57	16	21	6
Plane, smoothing, 8"	62	21	11	6
Pliers, combination, slip joint, 6"	87	13	0	0
Pliers, diagonal cutting, 5"	71	18	4	7
Pliers, combination slip joint, 10"	74	15	7	4
Pliers, lock type, parallel jaws, 8"	70	11	11	8
Punches, center, assorted	75	23	2	0
Pliers, needle nose, 5"	60	32	4	4

TOOLS	VALUE (per cents)			
Punches, drift, assorted	65	22	11	2
Punches, pin, assorted	55	38	7	0
Punches, prick	40	41	13	6
Punches, solid hand	44	38	13	5
Regulator set, acetylene	70	6	13	11
Regulator set, oxygen	71	6	13	10
Respirator, paint	49	19	23	9
Rack, wood storage	88	4	4	4
Rasps, flat rasps, half round	70	22	4	4
Rivet sets 3/16" and 1/8"	32	28	30	10
Rule, steel, 8', push pull	77	11	8	4
Sander, belt type	38	29	29	4
Sander, disc type	34	17	19	30
Sander, vibrator type	44	19	23	14
Saw, compass	48	29	18	5
Saw, coping	60	32	6	2
Saw, crosscut, hand	92	8	0	0
Saw, keyhole	58	30	8	4
Saw, rip, hand	80	16	4	0
Saw, back, 16"	66	19	13	2
Saw, circular table,10" minimum	88	4	8	0
Saw horses	90	10	0	0
Scrapers, paint	58	30	6	6
Screwdrivers, assorted	92	8	0	0
Screwdrivers, assorted	69	25	6	0

TOOLS	VALUE (per cents)			
Screwdriver, spiral ratchet	39	21	28	12
Screwdriver bits, assorted	48	39	13	0
Shield, hand observation	74	20	6	0
Shield, face, for grinding	85	15	0	0
Shovels	53	30	17	0
Slag, tools, welding	81	9	6	4
Soldering iron, electric, 250 watts	54	34	10	2
Snips, tinners, 10"	63	33	4	0
Squares, bevel	72	28	0	0
Squares, carpenters' framing	96	4	0	0
Squares, combination	82	10	6	2
Squares, try	94	6	0	0
Stamp set, steel, ½" letters and figures	11	20	46	23
Stones, oil	75	21	2	2
Stencils, adjustable lettering, 2"	16	23	49	12
Stools, welding	37	16	26	21
Tape, steel, 50'	49	20	25	6
Tester, battery cell	2	29	40	29
Tip cleaners, blowpipe	62	19	8	4
Tongs, bolt, blacksmiths, 24"	43	28	20	9
Tongs, ploughshare, 24"	30	35	21	14
Tongs, straight-lipped, 24"	40	30	19	11
Torch, blow, 1 quart	19	44	25	12
Torch, cutting, blowpipe type	50	18	17	15

TOOLS	VALUE (per cents)			
Trammel points, pair	14	25	25	36
Trowel, cement	27	38	33	2
Vise, blacksmiths	83	6	7	4
Vise, machinists	81	9	6	4
Vise, pipe, ¼" to 4" chain type	34	32	22	12
Vise, woodworking	94	6	0	0
Vise grips, 8"	85	13	0	2
Vise grips, 12"	70	19	9	2
Welder, arc, AC, 180 amps.	87	11	2	0
Wrench set, tappet, 7/16 to 3/4" by 16ths	51	33	5	11
Wrenches, combination, box and end type - ½" to 1"	87	1313	0	0
Wrenches, cresent, 8"	90	8	2	0
Wrenches, cresent, 10"	92	8	0	0
Wrenches, cresent, 18"	65	15	6	14
Wrenches, master set, ½" drive, 12 points	64	18	7	11
Wrenches, pipe, 8"	60	22	7	11
Wrenches, pipe, 12"	59	25	5	11
Wrenches, pipe, 18"	57	26	9	8
Wrenches, pipe, 36"	25	25	15	35
Wrenches for spark plugs	51	29	13	7
Wrenches, tank, acetylene	66	19	6	9
Wrenches, Allen, set, 1/16" to ½" by 16ths	75	23	2	0

When this evaluation was completed, the following tools were eliminated from the original evaluation sheet because less than 81 per cent of the instructors did not consider them necessary in the first three areas.

TABLE II

LIST OF TOOL ELIMINATED FROM ORIGINAL EVALUATION SHEET

TOOL	PER CENT OF TEACHERS RECOMMENDING THIS TOOL IN THE FIRST THREE AREAS
Awl, scratch	80
Compressor, air, stationary	57
Drill, star, cement	80
Gage, U.S. Standard for iron sheet, wire	75
Gasoline firepot	33
Ladle, pouring lead	49
Lathe, metal turning	52
Sander, disc type	70
Stamp set, steel, ½"	77
Stools, welding	79
Tester, battery cell	69
Trammel points, pair	54
Wrench, pipe, 36"	65

The results obtained from the five related questions at the end of the evaluation sheet formed the basis for the

approximate size of the shop for which these tools are recommended.

The estimated cost of a well-equipped vocational agricultural shop was found to be approximately $3600.00.

The suggested floor space for a farm mechanics shop was 3200 square feet.

As to whether a separate tool room warranted the extra expense, 86 per cent of the teachers stated "No" and 14 per cent stated "Yes."

In their answer to the question, "Should an extra toilet and washroom be included?", 91 per cent of the teachers stated "Yes," and nine per cent, "No."

Of the 60 teachers returning the evaluation sheet 21 (35 per cent) made suggestions, but these were all in relation to the arrangement or placement of tools which are not within the scope of this survey.

SECTION VI

SUMMARY AND CONCLUSION

Seventy-two evaluation sheets were sent to the seventy-two vocational agricultural instructors in South Dakota. Eighty-three per cent of these were returned.

After tallying the suggested tool list, the number of each tool essential in a new farm mechanics shop was found by taking the total number of those suggested and dividing this by the total responding. This number resulted in an average for each tool resulting in a basis for the basic tool list as indicated in Table III on page 26 of this study.

The following factors would to some extent limit the conclusions of this study:

1. The teachers who have not acquired the ability to use a certain tool would, no doubt, tend to de-emphasize that tool.
2. The mechanical ability and interests of teachers may vary, and this would necessarily influence the emphasis they would place on the use of each tool.
3. Some of the teachers did not check every tool.
4. The tools used in vocational agricultural shops could vary in accordance with the needs of the community in which the shop is located.
5. The average vocational agricultural department in

South Dakota now has 41 students[1]. A larger or smaller number of students would necessitate more or fewer tools than suggested in the recommended list (Table III).

In view of the limitations mentioned, the following conclusions may be drawn from this study:

1. Of the 171 tools listed on the evaluation sheet only thirteen (Table II) were considered non-essential in a new farm mechanics shop.
2. The recommended tool list is not designed to meet the needs of every vocational agricultural shop; however it is presented as a guide from which to work when purchasing tools for a new farm mechanics shop or surveying the needs of an established shop.
3. In some communities a few of the tools listed would have little or no value, but as they fit the needs in a majority of cases, they were considered essential.
4. If the quantity of a certain tool recommended ranged from one to two, it would be up to the shop instructor to survey his community to determine whether he had need of one or two of this tool.
5. There may be exceptions, depending upon the needs

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[1] South Dakota Newsletter, Department of Public Instruction, Division of Vocational Education, Pierre, South Dakota, Volume XXVII, Number 5, p. 7.

of the community, and under the column "Never used," and said to be such in Table II, the tool might find use in remote cases.

SECTION VII

RECOMMENDATIONS

Not all of the tools presented by this survey of 60 vocational agricultural teachers in South Dakota can be used in every farm mechanics shop. Most will be used, but a few may not meet the needs of the community. With these limiting factors in mind, the author offers the following recommendations to help alleviate many of the problems in purchasing new tools for a vocational agricultural shop.

1. All the tools listed in Table III are considered essential enough to be included in a new vocational agricultural shop in South Dakota.
2. All the tools listed in Table II may find use in certain farm mechanics shops, but funds should not be expended on these tools in a new farm mechanics shop.
3. The present estimated cost of tools for a farm mechanics shop is $3600.00, and this figure may be used as a guide in determining the cost of equipping a shop.
4. The farm mechanics shop for which these tools are recommended should have at least 3200 square feet of floor space.
5. The farm mechanics shop should be of sufficient

size to accommodate the number of student enrolled.

6. An extra toilet and washroom should be provided.

The problem of purchasing the correct tools for a farm mechanics shop is a serious one. The future success of the vocational agricultural program may depend upon the smooth operation of the shop. With the proper tools the well-trained vocational agricultural teacher can conduct a good program and bring strong support from many segments of the school and community.

TABLE III

BASIC TOOL LIST FOR A FARM MECHANICS SHOP IN SOUTH DAKOTA

TOOL	Quantity
I. GENERAL PURPOSE	
Bar, wrecking, 30"	2
Benches, work, wall type	4
Brushes, wire	2 - 3
Caliper, inside	1
Caliper, outside	1
Cans, gasoline	2
Cans, oil	2
Chisels, cape	2 - 3

TOOL	QUANTITY
Chisels, cold	5 - 6
Chisels, diamond point	1
Compressor, air, portable	1
Cutter, bolt, 24"	1
Dividers	1
Dresser, grinding wheel	1
Drill, electric, hand ½"	1
Drill, electric, hand ¼"	1
Drill press, ½" chuck	1
Drills, set, twist, 1/10" to ½" by 64ths	1
Extension cords, 25' to 50'	2
File card and brush	1 - 2
Files, flat, assorted	4 - 5
Files, half round, assorted	3
Files, mill, assorted	3
Files, round, assorted	3
Files, square, assorted	2
Files, triangular, assorted	4
Funnels	2
Grinder, high speed	1
Grinder, slow speed, wet	0 - 1
Hacksaws	3 - 4
Hammer, ball pein	4 - 5

TOOL	QUANTITY
Hammer, sledge	1
Measures, oil	1
Nippers, cutting	1 - 2
Pliers, combination, slip joint, 6"	3 - 4
Pliers, combination, slip joint, 10"	1 - 2
Pliers, diagonal cutting, 5"	1 - 2
Pliers, lock type, 8"	1 - 2
Pliers, lock type, 12"	1 - 2
Pliers, needle nose, 5"	1
Punch, prick	1 - 2
Punch, solid hand	1 - 2
Punches, center, assorted	3
Punches, drift, assorted	2
Punches, pin, assorted	2 - 3
Rasps, flat	3
Rasps, half round	3
Rule, steel, 8', push-pull type	2 - 3
Screwdrivers, assorted	2 - 3
Screwdrivers, Phillips, assorted	2 - 3
Screwdriver, spiral ratchet	1
Screwdriver bits, assorted	2 - 3
Shields, face, for grinder	2
Shovels	1 - 2

TOOL	QUANTITY
Snips, tinners, 10"	1 - 2
Squares, bevel	2 - 3
Squares, carpenters framing	4
Squares, combination	2 - 3
Squares, try	6
Tape, steel, 50'	1
Torch, blow, 1 quart	1
Vise, machinists	1 - 2
Wrenches, cresent, 8"	2
Wrenches, cresent, 10"	1 - 2
Wrenches, cresent, 12"	1
II. CARPENTRY AND WOODWORKING	
Bit, expansive 7/8" to 3"	1
Bits, set of, auger, wood, 3/16" to 1" by 16ths	1
Braces, auger, ratchet	3
Chisels, socket type, ¼" to 2"	2 - 3
Clamps, adjustable hand screw, 6" to 10"	5
Clamps, "C", metal	5 - 6
Clamps, "I", bar, 5'	5
Countersinks, rose head	2
Drawing knife, 8" or 10"	2
Drill, automatic (8 drill points)	

TOOL	QUANTITY
Drill, hand, ½" chuck capacity	1
Hammers, claw, curved, 16 oz.	7 - 8
Hammers, claw, ripping, 16 oz.	3
Hatchet, 4" flooring or half	1
Jointer, 6" with 3/4 H.P. motor	1
Level, carpenters, 24"	1 - 2
Mallets, wood	4
Mitre box and saw	1
Nail puller, heavy duty, 18"	1
Nail sets, assorted	2 - 3
Plane, block, 6"	3 - 4
Plane, jack, 14"	5 - 6
Plane, jointer, 20"	1 - 2
Plane, smoothing, 8"	2 - 3
Rack, wood storage	2
Saw, back, 16"	3
Saw, band	1
Saw, circular table, 10" minimum	1
Saw, compass	1 - 2
Saw, coping	2 - 3
Saw, crosscut, hand	4 - 5
Saw, keyhole	1 - 2
Saw, rip, hand	3

TOOL	QUANTITY
Saw horses	5
Sander, belt type	1
Sander, vibrator type	1
Stones, oil	2-- 3
Vises, woodworking	6 - 7
III. HOT AND COLD METAL WORK	
Anvil, cast iron body 150# to 200#	1
Forge	1
Hammer, straight pein, 14 oz.	1 - 2
Tongs, bolt, blacksmiths, 24"	1
Tongs, ploughshare, 24"	1
Tongs, straight-lipped 24"	1
Vise, blacksmiths	1 - 2
IV. CONCRETE AND MASONRY	
Edger, cement	1
Float, cement	1
Groover, cement	1
Trowel, cement	1
V. PAINTING AND GLAZING	
Brushes, paint, assorted	6

TOOL	QUANTITY
Cutter, glass	2 - 3
Gun, paint spray	1
Knife, putty	3 - 4
Respirator, paint	1
Scrapers, paint	8 - 9
Stencils, adjustable lettering, 2"	1
VI. PLUMBING AND PIPE FITTING	
Cutter, pipe	1
Dies, set of pipe, 1/8" to 2" ratchet	1
Vise pipe, ¼" to 4", chain type	1
Wrench, pipe, 8"	1
Wrench, pipe, 12"	1
Wrench, pipe, 18"	1
VII. SHEET METAL AND SOLDERING	
Coppers, soldering, assorted 1# to 3#	2 - 3
Iron, electric soldering, 250 watts	1
Rivet sets, 3/16" and 1/8"	1
Torch, blow, 1 quart	1
VIII. TRUCK, TRACTOR AND MACHINERY REPAIR	
Hoist and frame, 8 ft., lift 2000 lbs.	1

TOOL	QUANTITY
Oilers, pump type	1
Wrenches, Allen set, 1/16"to ½" by 16ths	1
Wrenches, combination box and open end	2
Wrenches, master set, ½" drive, 12 points	0 - 1
Wrench set, tappet, 7/16" to 3/4" by 16ths	1
Wrenches for spark plugs, ½" to 1"	1
Gun, grease, zerk, lever type	1
IX. WELDING, ARC AND OXY-ACETYLENE	
Bench, arc-welding	1 - 2
Bench, gas welding	1
Blowpipes, oxy-acetylene	1 - 2
Blowpipe tips, (no. 1 - 7)	1 - 2
Fire extinguisher, CO_2	1 - 2
Fire extinguisher, foam type	1
Gloves, pair	3 - 4
Goggles, pair, gas	3
Helmets, arc welding	4
Hoses, set of welding	1
Lighters, gas	1 - 2
Regulator set, acetylene	1 - 2
Regulator set, oxygen	1

TOOL	QUANTITY
Shield, hand observation, arc welding	1
Slag, tools, welding	2
Tip cleaners, blowpipe	1
Torch, cutting, blowpipe type	1
Welder, arc, A.C., 180 amps	1 - 2
Wrenches, tank, acetylene	1

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APPENDICES

APPENDIX A

Elkton, South Dakota
April 19, 1957

Dear Vo-Ag Teacher:

Enclosed you will find an "Evaluation Sheet" for a new Vo-Ag shop in South Dakota.

For my graduate research I am writing a paper on the setting up of a new Vo-Ag shop in South Dakota. I hope it will be of value to anyone starting a new Vo-Ag department or building a new Vo-Ag shop. This information may also be of value to instructors who already have a shop, but have never had it completely equipped.

I would very much appreciate it if you could send this sheet back by the first week in May as I hope to complete this work by the middle of June.

Sincerely yours,

Kenneth L. Bohuslav
Vo-Ag Teacher
Elkton High School

APPENDIX B

EVALUATION SHEET

SCHOOL_____

The following is a list of suggested tools and equipment for a new Vo-Ag shop. Please place in the space provided the value of this tool in your shop. 1. Used a great deal. 2. Necessary but not used frequently. 3. Necessary, but not essential in a beginning shop. 4. Never used. In the parenthesis indicate the number of these tools you think are required in a Vo-Ag shop. Please do not change any of the items, but add any changes or additions at the end in the space provided.

		1	2	3	4
Anvil, cast iron body, 150# to 200#	( )	___	___	___	___
Awl, scratch	( )	___	___	___	___
Band saw	( )	___	___	___	___
Bar, wrecking	( )	___	___	___	___
Bench, arc welding	( )	___	___	___	___
Bench, gas welding	( )	___	___	___	___
Bench, work, wall type	( )	___	___	___	___
Bit, expansive 7/8" to 3" extra cutter	( )	___	___	___	___
Bits, set of, auger wood 3/16" to 1" by 16ths	( )	___	___	___	___
Blowpipes, oxy-acetylene	( )	___	___	___	___
Blowpipe tips (no. 1-7)	( )	___	___	___	___
Bolt cutter 24"	( )	___	___	___	___
Braces, auger ratchet	( )	___	___	___	___
Brushes, paint, assorted	( )	___	___	___	___
Brush, wire	( )	___	___	___	___
Caliper, inside	( )	___	___	___	___
Caliper, outside	( )	___	___	___	___
Cans, gasoline	( )	___	___	___	___

		1	2	3	4
Cans, oil	( )				
Chisels, cape	( )				
Chisels, cold	( )				
Chisels, diamond point	( )				
Chisels, socket type ¼" to 2"	( )				
Clamps, adjustable hand, screw, 6" to 10"	( )				
Clamps, "C", metal	( )				
Clamps, "I", bar, 5'	( )				
Compressor, air, portable	( )				
Compressor, air, stationary	( )				
Coppers, soldering, assorted 1# to 3#	( )				
Countersink, rose head	( )				
Cutter, glass	( )				
Cutter, pipe	( )				
Dies, set of, pipe 1/8" to 2" ratchet	( )				
Dividers	( )				
Drill, automatic (8 drill points)	( )				
Drill, hand, ¼ chuck capacity	( )				
Drill set, twist 1/16" to ½" by 64ths	( )				
Drill, star, cement	( )				
Drill press, ½" chuck	( )				
Draw knife, 8" or 10"	( )				
Edger, cement	( )				
Electric extension cord 25' or 50'	( )				
Electric hand drill, ½"	( )				
Electric hand drill, ¼"	( )				

File card and brushes- - - - - - - - - - ( ) ___ ___ ___ ___

Files, flat,assorted - - - - - - - - - - - ( ) ___ ___ ___ ___

Files, half-round, assorted - - - - - - - -( ) ___ ___ ___ ___

Files, mill, assorted - - - - - - - - - - -( ) ___ ___ ___ ___

Files, round, assorted - - - - - - - - - - ( ) ___ ___ ___ ___

Files, square, assorted - - - - - - - - - -( ) ___ ___ ___ ___

Files, triangular, assorted - - - - - - - -( ) ___ ___ ___ ___

Fire extinguisher, CO_2 - - - - - - - - - - ( ) ___ ___ ___ ___

Fire extinguisher, foam type - - - - - - - ( ) ___ ___ ___ ___

Float, cement - - - - - - - - - - - - - - -( ) ___ ___ ___ ___

Forge - - - - - - - - - - - - - - - - - - -( ) ___ ___ ___ ___

Funnels - - - - - - - - - - - - - - - - - - ( ) ___ ___ ___ ___

Gage, U.S. Standard for iron sheet, wire ( ) ___ ___ ___ ___

Gasoline firepot - - - - - - - - - - - - - ( ) ___ ___ ___ ___

Grinder, high speed - - - - - - - - - - - -( ) ___ ___ ___ ___

Grinder, slow speed, wet - - - - - - - - - ( ) ___ ___ ___ ___

Grinding wheel, dresser - - - - - - - - - -( ) ___ ___ ___ ___

Gloves, pair - - - - - - - - - - - - - - - ( ) ___ ___ ___ ___

Goggles, pair, gas - - - - - - - - - - - - ( ) ___ ___ ___ ___

Groover, cement - - - - - - - - - - - - - -( ) ___ ___ ___ ___

Gun, grease, zerk, lever type - - - - - - -( ) ___ ___ ___ ___

Gun, paint spray - - - - - - - - - - - - - ( ) ___ ___ ___ ___

Hammers, ball pein - - - - - - - - - - - - ( ) ___ ___ ___ ___

Hammers, claw curved,16 oz. - - - - - - - -( ) ___ ___ ___ ___

Hammers, claw ripping, 16 oz. - - - - - - -( ) ___ ___ ___ ___

		1	2	3	4
Hammers, sledge - - - - - - - - - - - - - -	( )	___	___	___	___
Hammers, straight pein, 14 lbs. - - - - -	( )	___	___	___	___
Hatchet, 4" flooring or half - - - - - - -	( )	___	___	___	___
Helmets, arc welding- - - - - - - - - - - -	( )	___	___	___	___
Hoist and frame, 8ft., lift 2000 lbs. - -	( )	___	___	___	___
Hoses, set of welding - - - - - - - - - - -	( )	___	___	___	___
Jointer, 6", with 3/4 H. P. motor - - - -	( )	___	___	___	___
Knife, putty - - - - - - - - - - - - - - - -	( )	___	___	___	___
Ladle, pouring lead - - - - - - - - - - - -	( )	___	___	___	___
Lathe, wood turning - - - - - - - - - - - -	( )	___	___	___	___
Lathe, metal turning - - - - - - - - - - -	( )	___	___	___	___
Level, carpenters 24" - - - - - - - - - - -	( )	___	___	___	___
Lighters, gas - - - - - - - - - - - - - - -	( )	___	___	___	___
Mallets, wood - - - - - - - - - - - - - - -	( )	___	___	___	___
Measures, oil - - - - - - - - - - - - - - -	( )	___	___	___	___
Mitre box and saw - - - - - - - - - - - - -	( )	___	___	___	___
Nail puller, heavy duty 18" - - - - - - - -	( )	___	___	___	___
Nail sets, assorted - - - - - - - - - - - -	( )	___	___	___	___
Hacksaws - - - - - - - - - - - - - - - - - -	( )	___	___	___	___
Oilers, pump type - - - - - - - - - - - - -	( )	___	___	___	___
Paint cabinet - - - - - - - - - - - - - - -	( )	___	___	___	___
Plane, block 6" - - - - - - - - - - - - - -	( )	___	___	___	___
Plane, jack, 14" - - - - - - - - - - - - -	( )	___	___	___	___
Plane, jointer, 20" - - - - - - - - - - - -	( )	___	___	___	___
Plane, smoothing, 8" - - - - - - - - - - -	( )	___	___	___	___
Pliers, combination slip joint 6" - - - -	( )	___	___	___	___

		1	2	3	4
Pliers, diagonal cutting 5" - - - - - - -	( )	___	___	___	___
Pliers, combination slip joint 10" - - -	( )	___	___	___	___
Pliers, lock type, parallel jaws, 8"- - -	( )	___	___	___	___
Punches, center, assorted - - - - - - - - -	( )	___	___	___	___
Pliers, needle nose 5" - - - - - - - - - -	( )	___	___	___	___
Punches, drift, assorted - - - - - - - - -	( )	___	___	___	___
Punches, pin, assorted - - - - - - - - - -	( )	___	___	___	___
Punches, prick - - - - - - - - - - - - - -	( )	___	___	___	___
Punches, solid hand - - - - - - - - - - - -	( )	___	___	___	___
Regulator set, acetylene - - - - - - - - -	( )	___	___	___	___
Regulator set, oxygen - - - - - - - - - -	( )	___	___	___	___
Respirator, paint - - - - - - - - - - - -	( )	___	___	___	___
Rack, wood storage - - - - - - - - - - -	( )	___	___	___	___
Rasps, flat rasps, half round - - - - - -	( )	___	___	___	___
Rivet sets 3/16" and 1/8" - - - - - - - -	( )	___	___	___	___
Rule, steel 8', push-pull - - - - - - - -	( )	___	___	___	___
Sander, belt type - - - - - - - - - - - -	( )	___	___	___	___
Sander, disc type - - - - - - - - - - - -	( )	___	___	___	___
Sander, vibrator type - - - - - - - - - -	( )	___	___	___	___
Saw, compass - - - - - - - - - - - - - - -	( )	___	___	___	___
Saw, coping - - - - - - - - - - - - - - -	( )	___	___	___	___
Saw, crosscut, hand - - - - - - - - - - -	( )	___	___	___	___
Saw, keyhole - - - - - - - - - - - - - - -	( )	___	___	___	___
Saw, rip, hand - - - - - - - - - - - - - -	( )	___	___	___	___
Saw, back, 16" - - - - - - - - - - - - - -	( )	___	___	___	___

		1	2	3	4
Saw, circular table, 10" minimum	( )				
Saw horses	( )				
Scrapers, paint	( )				
Screwdrivers, assorted	( )				
Screwdrivers, Phillips, assorted	( )				
Screwdriver, spiral ratchet	( )				
Screwdriver bits, assorted	( )				
Shield, hand observation, arc welding	( )				
Shield, face, for grinder	( )				
Shovels	( )				
Slag, tools, welding	( )				
Soldering iron, electric, 250 watts	( )				
Snips, tinners, 10"	( )				
Squares, bevel	( )				
Squares, carpenters' framing	( )				
Squares, combination	( )				
Squares, try	( )				
Stamp set, steel, $\frac{1}{8}$" letters & figures	( )				
Stones, oil	( )				
Stencils, adjustable lettering 2"	( )				
Stools, welding	( )				
Tape, steel, 50'	( )				
Tester, battery cell	( )				
Tip cleaners, blowpipe	( )				
Tongs, bolt, blacksmiths, 24"	( )				
Tongs, ploughshare, 24"	( )				

		1	2	3	4
Tongs, straight-lipped 24"	( )				
Torch, blow, 1 quart	( )				
Torch, cutting, blowpipe type	( )				
Trammel points, pair	( )				
Trowel, cement	( )				
Vise, blacksmith's	( )				
Vise, machinist's	( )				
Vise pipe ¼ " to 4" chain type	( )				
Vise, woodworking	( )				
Vise grips, 8"	( )				
Vise grips, 12"	( )				
Welder,arc, AC, 180 amps	( )				
Wrench set, tappet, 7/16 to 3/4 by 16ths	( )				
Wrenches, combination, box and end type ½" to 1"	( )				
Wrenches, cresent,8"	(( )				
Wrenches, cresent, 10"	( )				
Wrenches, cresent, 18"	( )				
Wrenches, master set,½" drive, 12 points	( )				
Wrenches, pipe 8"	( )				
Wrenches, pipe 12"	( )				
Wrenches, pipe, 18"	( )				
Wrenches, pipe, 36"	( )				
Wrenches for spark plugs, ½" to 1"	( )				
Wrenches, tank, acetylene	( )				
Wrenches, Allen, set, 1/16" to ½" by 16ths	( )				
_____	( )				

		1	2	3	4
_____	( )	___	___	___	___
_____	( )	___	___	___	___
_____	( )	___	___	___	___
_____	( )	___	___	___	___

1. What is your estimate of the cost of a completely equipped shop? (Tools only)

   _____

2. What size should an Ag shop be? _____

3. Do you think a separate tool room is necessary enough to warrant the extra expense?

   _____

4. Should an extra toilet and washroom be included?

   _____

5. Please list any other suggestions you might have.

APPENDIX C

NAMES AND LOCATIONS OF PARTICIPATING VOCATIONAL AGRICULTURE INSTRUCTORS

TEACHER	DEPARTMENT
E. R. Dobberstein	Alcester
Doyle B. Tanner	Bennett County
E. S. Chicoine	Beresford
M. W. Magnuson	Brandon
Gerhardt Schaal	Bridgewater
R. A. Humphrey	Bristol
J. E. Kleinsasser	Brookings
Douglas Hoseck	Bryant
Elmer Haveman	Burke
W. R. Bryant	Centerville
Richard L. Zeigler	Chester
E. W. Gustafson	Clark
Ray Reiff	Colman
Orville Berkland	Dell Rapids
Harlan Tlustos	DeSmet
A. F. Tonn	Elk Point
Sylvan Vigness	Flandreau
Donald T. Tupper	Faulkton
Truman Maursetter	Garretson
Donald Pearson	General Beadle
Stephan M. Polich	Gettsburg

TEACHER	DEPARTMENT
Robert Robertson	Groton
Earnest Wingen	Hoven
Kenneth Olson	Hudson
Ben T. Nelson	Huron
A. J. Matson	Lake Preston
James Smith	Lemmon
George Wells	Lennox
Edward Renaas	Marion
Lyle McLellan	McIntosh
James Knudson	Miller
George Matz	New Effington
Walter Johnson	Newell
J. Milton Lang	New Underwood
Paul Murray	Parker
Harold B. Garry	Parkston
Marvin Larson	Redfield
Clarence Grebner	Roslyn
Wilford H. Wallace	Salem
Loren Kasten	Scotland
Wayne Gray	Sturgis
Lawrence R. Hohbach	Tyndall
Charles Stormo	Volga
Edward J. Jaeger	Wagner
Clarence R. Hall	Watertown